



Re-Accredited 'B++' 2.86 CGPA by NAAC

**VEER NARMAD SOUTH GUJARAT UNIVERSITY**

University Campus, Udhna-Magdalla Road, SURAT - 395 007, Gujarat, India.

**વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી**

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ક્રમાંક :ઓથો./પરિપત્ર/૧૨૧૭૮/૨૦૨૫

તા.૩૧/૦૫/૨૦૨૫

પ્રતિ,  
વડાશ્રી,  
બાયોટેકનોલોજી ડિપાર્ટમેન્ટ,  
વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી,  
સુરત.

**વિષય:— પ્રથમ વર્ષ બાદ Exit થનાર અને દ્વિતીય વર્ષ બાદ Exit થનાર વિદ્યાર્થીઓ માટે  
Vocational Exit Course નાં અભ્યાસક્રમ અંગે.**

મહાશય,

સવિનય જણાવવાનું કે, શૈક્ષણિક વર્ષ ૨૦૨૫-૨૬ થી NEP-2020 અંતર્ગત પ્રથમ વર્ષ બાદ Exit થનાર વિદ્યાર્થીઓને સર્ટિફિકેટ એનાયત કરવા અને દ્વિતીય વર્ષ બાદ Exit થનાર વિદ્યાર્થીઓને ડિપ્લોમાં એનાયત કરવા સંદર્ભે નિયુક્ત પેટાસમિતિ દ્વારા તૈયાર કરવામાં આવેલ ૪ ક્રેડિટના Vocational Exit Course અંગે બાયોટેકનોલોજી વિષયની અભ્યાસ સમિતિની તા.૧૮/૦૪/૨૦૨૫ ની સભાના ઠરાવ ક્રમાંક:૦૨ અને ૦૩ થી કરેલ ભલામણ સ્વીકારી વિજ્ઞાન વિદ્યાશાખાની તા.૩૦/૦૪/૨૦૨૫ની સભાનાં ઠરાવ ક્રમાંક:૩૫ થી કરેલ ભલામણ સ્વીકારી એકેડેમિક કાઉન્સિલની તા.૦૫/૦૫/૨૦૨૫ ની સભાનાં ઠરાવ ક્રમાંક: ૯૯ થી મંજૂર કરેલ છે. જેનો અમલ કરવા આથી જાણ કરવામાં આવે છે.

બિડાણ: ઉપર મુજબ

*W. J. J.*  
કુલસચિવ

પ્રતિ,

- ૧) ડીનશ્રી, વિજ્ઞાન વિદ્યાશાખા.
  - ૨) પરીક્ષા નિયામકશ્રી, પરીક્ષા વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.
- .....તરફ જાણ તેમજ અમલ સારૂ.

## VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

### Vocational Exit Course for UG Certificate in Biotechnology

Course Code	BT-VEC-01								
Course Title	<b>Core Concepts in Biotechnology</b>								
Credits	4								
Course Level	100-199								
Total engagement	3 Credits x 15 h = 45 h (Theory) & 1 Credit x 30 h = 30 h (Practical) <b>Total 4 Credits (75 h)</b>								
Effective from	2025-26								
Purpose of Course	In line with the National Education Policy 2020 and its provision for a multi-exit system, this course is designed for students who wish to exit the Biotechnology Program after the successful completion of the first year (Semester-I and II) with Biotechnology as their major.								
Course Objectives	This course aims to introduce students to the fundamental principles of immunology and molecular biology, providing a strong theoretical foundation. Additionally, the course imparts essential knowledge of statistical methods relevant to biological sciences, enabling students to interpret and analyze scientific data effectively. Emphasis is placed on developing practical laboratory skills and proficiency in data analysis to prepare students for research and applied biosciences.								
Course Outcomes	CO1: Students will grasp the basics of immunity, immune cells, antigens, antibodies, and the role of MHC in regulating immune responses. CO2: Students will understand the structure and function of nucleic acids, the mechanisms of gene expression, and the basics of molecular biology techniques like gel electrophoresis, PCR, and blotting. CO3: Students will learn methods of data representation, basic statistical measures, and concepts like probability, hypothesis testing, correlation, regression, and ANOVA relevant to life sciences. CO4: Students will gain practical experience in identifying blood groups and antigen-antibody reactions, performing DNA extraction and quantification, understanding PCR and gel electrophoresis, and applying statistical tools for data analysis using MS Excel.								
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
	CO1								
	CO2								
	CO3								
	CO4								
Pre-requisite	Completion of Semester-I & II of Biotechnology Program as per NEP 2020								
Course Content	<b>UNIT-1: Basics of Immunology:</b> Components and types of immunity (innate and adaptive). Cells and organs of the immune system. Antigens, antibodies, and antigen-antibody interactions. Major Histocompatibility Complex (MHC) and immune response regulation.							Teaching Hours: 15	

	<b>UNIT-2: Basics of Molecular Biology:</b> Structure and function of nucleic acids. DNA replication, transcription, and translation mechanisms. Gene regulation in prokaryotes and eukaryotes. Molecular biology tools and techniques (Gel electrophoresis, PCR, blotting).	Teaching Hours: 15
	<b>UNIT-3: Statistics for Life Sciences:</b> Types of data and data representation methods. Measures of central tendency and dispersion. Probability, hypothesis testing, and p-values. Correlation, regression, and basics of ANOVA.	Teaching Hours: 15
	<b>UNIT-4: Practical:</b> -Identifying blood groups and understanding antigen-antibody reactions. -Extraction of DNA from plant/animal cells and determination of concentration using spectrophotometry. -PCR Demonstration and Gel Electrophoresis -Data collection, statistical analysis using MS Excel	Teaching Hours: 30
Reference Books	<ol style="list-style-type: none"> <li>1. Kuby, J., Punt, J., &amp; Stranford, S. (2021). <i>Immunology</i>. Macmillan.</li> <li>2. Watson, J. D., et al. (2017). <i>Molecular Biology of the Gene</i>. Pearson.</li> <li>3. Sambrook, J., &amp; Russell, D. (2001). <i>Molecular Cloning: A Laboratory Manual</i>. Cold Spring Harbor Laboratory Press.</li> <li>4. Gupta, S. P. (2020). <i>Statistical Methods</i>. Sultan Chand &amp; Sons.</li> <li>5. Pelczar, M. J., et al. (2001). <i>Microbiology: Application in Biotechnology</i>. McGraw-Hill.</li> </ol>	
Teaching Methodology	Classwork, Discussion, Self-Study, Projects, Seminars and/or Assignment	
Evaluation methods	As per SOP for Exit Courses approved by University	

# VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

## Vocational Exit Course for UG Diploma in Biotechnology

Course Code	BT-VEC-02								
Course Title	<b>Biotech Essentials: Enzymes, Immunology &amp; Informatics</b>								
Credits	4								
Course Level	200-299								
Total Engagement	3 Credits x 15 h = 45 h (Theory) & 1 Credit x 30 h = 30 h (Practical) <b>Total 4 Credits (75 h)</b>								
Effective from	2025-2026								
Purpose of Course	In line with the National Education Policy 2020 and its provision for a multi-exit system, this course is designed for students who wish to exit the Biotechnology Program after the successful completion of the second year (Semester-III and IV) with Biotechnology as their major.								
Course Objective	This course provides a foundational understanding of genetic engineering, immunotechnology, bioinformatics and plant as well as animal biotechnology. Students will learn key techniques such as r-DNA technology, PCR, tissue culture and protein structure analysis. Practical sessions will build skills in molecular biology methods, mutagenesis, protein modelling and cell isolation, preparing students to think regarding various applications and orient them towards research in biological sciences.								
Course Outcomes	<p>CO1: Students will learn the basics of r-DNA technology, gene cloning, PCR techniques, and DNA sequencing methods, including RT-qPCR applications.</p> <p>CO2: Students will understand key immunological techniques like precipitation, agglutination, immunochromatography, and immunofluorescence, along with vaccine types and hypersensitivity reactions. They will also learn basic bioinformatics tools for protein structure prediction and evaluation.</p> <p>CO3: Students will understand the principles of plant and animal tissue culture, including totipotency, micropropagation, protoplast isolation, and somatic hybridization, along with gaining skills in aseptic techniques, media preparation, and handling cell culture equipment.</p> <p>CO4: Students will develop hands-on skills in DNA restriction digestion, bacterial mutagenesis studies, protein structure visualization, homology modelling, protoplast isolation, and animal cell isolation techniques.</p>								
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
	CO1								
	CO2								
	CO3								
	CO4								
Pre-requisite	Completion of Semester-III & IV of Biotechnology Program as per NEP 2020								
Course Content	<b>UNIT-1: Genetic Engineering:</b> Introduction to r-DNA technology, gene cloning and its importance, Restriction endo nucleases, DNA manipulative enzymes, PCR, RT-PCR, DNA sequencing method (chain termination, pyro sequencing, shotgun method), RT-qPCR								Teaching Hours: 15

	<p><b>UNIT-2: Immunotechnology &amp; Bioinformatics:</b> Precipitation, Agglutination, Immunochromatography, Immunofluorescence, Hypersensitivity reactions, Vaccines and their types, Methods for Secondary structure prediction: Chou Fasman and GOR; Protein structures evaluation (Procheck); Software for Secondary structure prediction.</p>	Teaching Hours: 15
	<p><b>UNIT-3: Plant &amp; Animal Biotechnology:</b> Introduction to plant and animal tissue culture, Totipotency, Micropropagation methods, Protoplast isolation, Somatic Hybridization, Applications of animal biotechnology, Equipment for cell culture, Aseptic environment, sterile handling, Complete media preparation and sterilization.</p>	Teaching Hours: 15
	<p><b>UNIT-4: Practical:</b> -Restriction digestion of vector DNA -To prepare a survival curve for the given bacterial culture using germicidal ultraviolet radiation as a mutagen. -Protein structure visualization by RasMol -Perform homology modelling using Swiss Model -To isolate protoplasts using Enzymatic Approach -Isolation of cells from spleen/Chick fibroblast.</p>	Teaching Hours: 30
Reference Books	<ol style="list-style-type: none"> <li>1. Willey, J.M., Sherwood, L. M., &amp; Woolverton, C. J. (2008). Prescott, Harley &amp; Klein's Microbiology, 7<sup>th</sup> Edition, The MCGraw-Hill Companies, Inc.</li> <li>2. Kubly Janis, (2007). <i>Immunology</i>, 6th Edition, Freeman and Company.</li> <li>3. Brown T. A. Gene Cloning and DNA analysis: an introduction. John Wiley &amp; Sons; 2016</li> <li>4. S. C. Rastogi, N. Mendiratta and P. Rastogi, 2<sup>nd</sup> Edition "Bioinformatics: Concepts, Skill &amp; Applications", CBS publisher &amp; Distributor, 2009.</li> <li>5. Mount, D. W., "Bioinformatics: Sequence and Genome analysis", Cold Spring Harbour Laboratory Press, 2001.</li> <li>6. Chawla, H. S. (2011). Introduction to plant biotechnology (3/e). CRC Press.</li> <li>7. Bhojwani, S. S., &amp; Razdan, M. K. (1986). Plant tissue culture: theory and practice. Elsevier.</li> <li>8. Freshney, I. (2016). Culture of Animal Cells: A Manual of Basic Technique and Specialized Applications (8th ed.). Wiley-Blackwell</li> <li>9. Patel, R., &amp; Patel, K. P. (2016) Experimental Microbiology (9<sup>th</sup> Ed., Vol. II). Aditya Publication.</li> <li>10. Nigam and A. Ayyagari (2019): Lab Manual in Biochemistry, Immunology and Biotechnology, Tata McGraw Hill Education Pvt. Ltd.</li> <li>11. Textbook of Medical Laboratory Technology Clinical Laboratory Science and Molecular Diagnosis 2 Vol Set 3<sup>rd</sup> Ed. (2018) by Praful Godkar and Darshan P. Godkar.</li> <li>12. Bhojwani, S. S., &amp; Razdan, M. K. (1986). Plant tissue culture: theory and practice. Elsevier.</li> </ol>	
Teaching Methodology	Classwork, Discussion, Self-Study, Projects, Seminars and/or Assignment	
Evaluation Methods	As per SOP for Exit Courses approved by University	